

CHM 340 Environmental Chemistry

Spring Semester 2007

Instructor: Dr. John Barbaro–
Phone: 238-7372

Office: Bair 101-F
E-mail: barbaroj@rocky.edu

Meeting Times

Class: MWF 11:45 AM - 12:35 PM

Course Description

This class will introduce the chemistry associated with many environmental topics, both natural environmental phenomena and human-induced environmental problems and solutions. We will discuss these by looking at the chemistry behind various current environmental situations. The laboratory section will deal with chemical synthesis and analysis (including NMR), chemical models of current environmental concerns, and experimental design.

Prerequisite: CHM 101, CHM 102, and CHM 300. (I strongly recommend that you have completed both semesters of organic chemistry, CHM 300 and 301 or the equivalent, before enrolling in this class.)

Class Objectives

1. To understand the general chemical principles associated with environmental phenomena.
2. To study the chemical reactions behind these environmental processes.
3. To increase your understand of chemical terminology associated with the environmental sciences.
4. To develop critical thinking skills.

Required Text and Attendance

There is no required text for this class. All necessary handouts will be distributed in class and posted on the web.

Since there is no corresponding textbook for this course, daily attendance in the lectures is both mandatory and necessary. I will use the lecture as my main means of communicating with you. My goal in class is to explain the material in the manner that I expect you to be able to use it. Missing even one lecture might prove to have a substantial negative impact on your performance on the tests. When I write your test questions I will assume that you have heard all of the material covered in class. For this reason, you must attend class daily to get all of the information for which you will be held responsible.

Please be attentive and quiet in class. If, for some reason, you come to class late or have to leave class early, please do so quietly as a courtesy to the other students in the class.

Cell phone use is strictly prohibited AT ALL TIMES in the lecture and in the laboratory.
Please turn off your cell phone BEFORE entering the classroom or the laboratory so that it does not ring during class.

Course Content

A general outline of the topics for the lecture material (in no specific order) for this class is given below. This order will probably change or be amended as the semester progresses to fit the interests of the students in the class.

Possible topics for CHM 340:

- Basic chemistry: atoms, isotopes, bonding
- Chemical composition of the world
- Properties of water
- Acids and bases
- Water cycle
- Eutrofication
- Atmospheric chemistry
- IR absorption and the greenhouse effect
- Decomposition of organic matter (aerobic and anaerobic processes)
- Nitrogen cycle
- Carbon cycle
- Phosphorus cycle
- Photosynthesis
- Nuclear chemistry
- ^{14}C -dating

Current issues:

- Energy sources (alternative fuels, geothermal power, solar, etc.)
- Fuel Cells
- Pesticides
- Pheromones and insect defense mechanisms
- Giant squid
- Air and water pollution
- Fertilizers
- Radon
- Deforestation
- Golden toads of Costa Rica
- Hormone mimics (phthalates and airplane deicers)
- Polymers (natural and synthetic)
- Recycling
- etc.

Office Hours

My office hours are: Monday, Wednesday, and Friday 8:45-9:45 AM and Th 9:30 -10:30 AM, or anytime I am free in my office (if my office door is open and I'm not with someone or on the phone, then I'm probably free). I will try to be available as much as possible. If you have any questions or problems, or are confused about anything covered in the class, no matter how trivial it may seem, please feel free to come and see me. If you cannot attend the scheduled office hours, please see me after class and we will schedule a meeting time that is mutually convenient.

Tests

There will be three in-class tests and a final exam during the semester. The schedule for these exams is as follows:

Test 1	Wednesday, February 1
Test 2	Wednesday, February 28
Test 3	Wednesday, March 28
Final Exam	Monday, April 30 (12:15 - 2:15 PM)

The exams will be short answer in nature, dealing with the terminology, concepts, and reactions that have been covered in class. These tests will also require you to apply the concepts covered in class to new situations and to offer explanations or predictions based on what you have learned. On every exam it will be assumed that you are familiar with all of the material covered from the beginning of the course. While very little of this material will be tested directly, often you will need to use previously covered concepts to answer a test question.

On all of the exams, **read the questions carefully and answer what is being asked.** Partial credit will be given on the tests where appropriate. Just because you write something down as an answer to a question does not mean that you will get partial credit – a whole lot of correct information that does not answer the question is still wrong and will not receive any credit.

Grading

Each class exam and the final exam will be graded out of 100 points. If you miss an exam for any reason then you will receive a zero on that exam. If you miss more than one exam or the final exam, you will receive an I or an F in the class, depending on the circumstances.

*Any problems with the grading on the class tests need to be brought to my attention **within one week** of when I return the papers to the class.* I will not change the grades on any papers after that time.

We all have a bad day on occasion, so in determining your final grade for the class I will replace your lowest test score on the three in class tests with the average of your lowest and highest test scores (i.e., if your highest test score is 90 and your lowest score is 60, I will replace the low score of 60 with a 75 (the average of 90 and 60) when I compute your final grade.

Your grade in the lecture portion of the course will be determined out of 100% as follows:

Average of three in class tests (after adjustment)	75%
Final Exam	25%

Your final grade for CHM 340 (class and lab) will be determined out of 100% as follows:

Class	75%
Lab	25%

Final grades will be assigned using the following scale: $\geq 85\%$ = A; 84 - 70% = B; 69 - 55% = C; 54 - 40% = D; $< 40\%$ = F.

Withdrawing From The Course

A student may withdraw from a course and receive a grade of W at any time up to and including Monday, March 19. After that date, you may no longer withdraw from the course and must receive a grade in the course.

Academic Honesty

The Academic Integrity Policies of Rocky Mountain College are available in the college catalog or on the college's web site. Cheating of any kind will not be tolerated in this class and will be dealt with accordingly.

CHM 340 – Environmental Chemistry
Laboratory Syllabus
Room 116 Bair Spring Semester 2007

Lab Times

Tuesday 1 - 4 p.m.

Lab Manual

Handouts will be given for all of the experimental procedures for this class.

Lab Objectives

1. To work safely and confidently with chemicals in the laboratory.
2. To develop proficiency with some techniques used routinely in chemistry labs.
3. To gain some experience with common laboratory instrumentation.
4. To reinforce and deepen understanding of concepts from the lecture.
5. To learn how to keep a laboratory notebook.
6. To develop the ability to interpret experimental results.
7. To gain some experience in designing experiments to test hypotheses.
8. To use spectroscopy to help identify compounds and their properties.
9. To gain some experience in writing a research paper and presenting results.

Laboratory Notebook And Lab Reports

You will need a laboratory notebook for this class. Any sewn-bound composition notebook is acceptable. Inexpensive notebooks are available at OfficeMax, Walmart, etc. Spiral bound and loose-leaf notebooks are not acceptable.

One of the best ways to do well in this lab is to be prepared each week when you show up for lab. Take the time to read the experiment procedure carefully and write up the prelab thoroughly. The better you understand the procedure, techniques, safety precautions, and any apparatus that you will be working with that day in lab, the more successful and safer your laboratory experience will be.

The format for writing your lab reports will be the same one as is used for the organic chemistry lab. I will have a handout for you on the lab report format, and you can also check the organic chemistry web site (www.rocky.edu/~barbaroj) to see what you need to include in your lab reports.

Missing Lab

There are no make-up labs in this course. If you are unable to finish an experiment in the time allotted, write up your lab report in your notebook with all of the information that you have completed. You may include a brief note explaining why you were unable to complete the experiment on time. To have an absence from lab excused, you must provide Dr. Barbaro with written documentation (a doctor's note, University excuse, etc.) explaining why the lab was missed. You are responsible for any information presented in lab even if you are absent.

Hazardous Waste & Safety Rules

These policies are posted on the organic chemistry web site. Please review these policies before coming to lab. Failure to observe laboratory safety rules and procedures may result in injury to you or to fellow students. For repeated violations, points will be deducted from your lab grade at the discretion of the instructor.

Schedule of Experiments*

<u>Date</u>	<u>Experiment</u>
January 16	Check in
January 23	Recycling
January 30	(cont.)
February 6	Impact of snow-melt on lakes and streams
February 13	(cont.)
February 20	Preparation of sunscreen derivatives
February 23-25	Yellowstone Trip
February 27	Analysis of sunscreen derivatives
March 6	Midterm break – no lab
March 13	Biodiesel
March 20	Independent projects
March 27	(cont.)
April 3	(cont.)
April 10	(cont.)
April 17	(cont.)
April 24	Check out / Formal Report

*These may change based on student interests

Grading and Late Penalties

Each experimental write-up, your paper and your presentation will be graded out of 100 pts. At the beginning of each experiment your notebook will be checked to see if you have completed the pre-lab portion of your experimental write-up. Failure to have the pre-lab portion of your lab report written in your notebook before the start of that day's lab will result in 20 points being deducted from that lab report's score.

Your notebook with the completed experimental write-up is due at the beginning of the lab period following the completion of an experiment. Since there are a few experiments this semester that run over more than one lab period, your notebook will not be turned in for grading every lab period. Five points will be deducted from your grade on that experimental write-up for each day that your lab notebook is late.

Your overall lab grade will be based on how efficiently you work in the laboratory and by your lab notebook lab reports.

Lab reports and performance	60%
Formal Report	40%

Independent Project

As the semester goes on e will design a short group project (or two) that deals with some aspect of environmental chemistry. You will have to write a formal report on the results of the class project. More information on the format of report will be given after midterm.

OPI/PEPPS Table for Syllabi

CHM 340 Environmental Chemistry

Standard	Course Objective
10.58.522 SCIENCE	
(2, a, iii, d) demonstrate understanding and experience of how to develop and maintain the highest levels of safety in classrooms, stockrooms, laboratories, and other areas related to instruction in science;	Lab objectives 1-3
(3, e) conceptual understanding of biology, chemistry, or physics, emphasizing the interrelationships among the sciences and their relations to earth science;	Course objectives 1-3
(5, g) conceptual understanding of the interaction of chemistry and technology in contemporary health, ethical, legal, and human issues (e.g., the effects of synthetic molecules and food additives on life systems and the disposal of toxic chemical wastes);	Course objectives 1-3